

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/11656

A. CLASSIFICATION OF SUBJECT MATTER  
Int.Cl.<sup>7</sup> C01B33/035

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl.<sup>7</sup> C01B33/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Toroku Jitsuyo Shinan Koho	1994-2003
Kokai Jitsuyo Shinan Koho	1971-2003	Jitsuyo Shinan Toroku Koho	1996-2003

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

JSTPlus (JOIS)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E, X	JP 2003-242016 A (Takayuki SHIMAMUNE), 03 December, 2003 (03.12.03), Claims; page 3, right column, lines 49 to 50 (Family: none)	1-9
P, X	JP 2003-95633 A (Yutaka KAMAIKE), 03 April, 2003 (03.04.03), Claims (Family: none)	1, 8
X A	D.A. SEIFERT, PILOT-SCALE DEVELOPMENT OF THE ZINC REDUCTION PROCESS FOR PRODUCTION OF HIGH- PURITY SILICON, AICHE SIMPOSIUM SERIES, 1982, No.216, Vol.78, pages 104 to 115	1-5, 7, 30-35, 37-38, 69 6, 8-29, 36, 39-68

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:  
 "A" document defining the general state of the art which is not considered to be of particular relevance  
 "E" earlier document but published on or after the international filing date  
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
 "O" document referring to an oral disclosure, use, exhibition or other means  
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone  
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art  
 "&" document member of the same patent family

Date of the actual completion of the international search  
16 December, 2003 (16.12.03)Date of mailing of the international search report  
13 January, 2004 (13.01.04)Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

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**Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

The invention of claims 1-9 relates to a process for producing silicon through a vapor-phase reaction of silicon tetrachloride and zinc, wherein silicon is deposited on seed crystals in a reaction furnace of 910°C or higher so as to obtain crystalline silicon.

The invention of claims 10-19 relates to a process for producing silicon through a vapor-phase reaction of silicon tetrachloride and zinc, wherein silicon melts are aggregated so as to obtain molten silicon.

The invention of claims 20-29 relates to a process for producing a high-purity silicon through a vapor-phase reaction of silicon tetrachloride and zinc, (continued to extra sheet)

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest** ☐ The additional search fees were accompanied by the applicant's protest.  
☒ No protest accompanied the payment of additional search fees.

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Continuation of Box No. II of continuation of first sheet(1)

wherein silicon is precipitated, melted and cooled to thereby obtain silicon.

The invention of claims 30-40 relates to a process wherein silicon tetrachloride and zinc are reacted with each other in an atmosphere of zinc tetrachloride, led into a retention tank of melting temperature or higher and cooled so as to effect solidification. The invention of claims 41-48 relates to a process for producing silicon, involving specified processes for producing zinc chloride and silicon tetrachloride. The invention of claims 49-68 relates to an apparatus for silicon production comprising a trap capable of collecting silicon formed by reaction and a process for producing silicon with the use of the production apparatus. The invention of claim 69 is directed to a method of reacting silicon tetrachloride with zinc wherein the reaction is conducted at a temperature lower than the melting point of silicon, while avoiding contact of the silicon with atmospheric air, thereby obtaining silicon.

It does not appear that between these inventions, there exists a technical relationship involving "special technical features".

Therefore, the requirement of unity of invention is not satisfied.

## A. 発明の属する分野の分類 (国際特許分類 (IPC))

Int. Cl. <sup>7</sup> C 01 B 33/035

## B. 調査を行った分野

調査を行った最小限資料 (国際特許分類 (IPC))

Int. Cl. <sup>7</sup> C 01 B 33/00

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報 1922-1996年  
 日本国公開実用新案公報 1971-2003年  
 日本国登録実用新案公報 1994-2003年  
 日本国実用新案登録公報 1996-2003年

国際調査で使用した電子データベース (データベースの名称、調査に使用した用語)

JSTPlus (JOIS)

## C. 関連すると認められる文献

引用文献の カテゴリー*	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示	関連する 請求の範囲の番号
E X	JP 2003-342016 A (島宗孝之)2003. 12. 03, 特許請求の範囲、第3頁 右欄49-50行目参照 (ファミリーなし)	1-9
P X	JP 2003-95633 A (蒲池豊)2003. 04. 03, 特許請求の範囲参照 (ファ ミリーなし)	1, 8
X	D. A. SEIFERT, PILOT-SCALE DEVELOPMENT OF THE ZINC REDUCTION P ROCESS FOR PRODUCTION OF HIGH-PURITY SILICON, AICHE SIMPOSIUM	1-5, 7, 30-35, 37-38, 69
A	SERIES, 1982, No. 216, Vol. 78 p. 104-115	6, 8-29, 36, 39-68

☐ C欄の続きにも文献が列挙されている。☐ パテントファミリーに関する別紙を参照。

## \* 引用文献のカテゴリー

「A」特に関連のある文献ではなく、一般的技術水準を示すもの

「E」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの

「L」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す)

「O」口頭による開示、使用、展示等に言及する文献

「P」国際出願日前で、かつ優先権の主張の基礎となる出願

の日の後に公表された文献

「T」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの

「X」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの

「Y」特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの

「&amp;」同一パテントファミリー文献

国際調査を完了した日

16. 12. 03

国際調査報告の発送日

13.01.04

国際調査機関の名称及びあて先

日本国特許庁 (ISA/J P)

郵便番号100-8915

東京都千代田区霞が関三丁目4番3号

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